



Insecta, Lepidoptera, Lycaenidae, *Arcas ducalis* (Westwood, 1852): first record from Uruguay

María Gabriela Bentancur Viglione^{1*}, José Carlos Guerrero² and Enrique Regino Morelli Mazzeo¹

¹ Universidad de la República, Facultad de Ciencias, Sección Entomología, CP. 11400, Montevideo, Uruguay

² Universidad de la República, Facultad de Ciencias, Laboratorio de Desarrollo Sustentable y Gestión Ambiental del Territorio (LDSGAT), Instituto de Ecología y Ciencias Ambientales (IECA), CP. 11400, Montevideo, Uruguay

* Corresponding author. E-mail: gbentancur@fcien.edu.uy

Abstract: This note documents the first record of *Arcas ducalis* (Westwood, 1852) in Uruguay and provides an updated geographic distributional map of the species, extending its known range by over 200 km. This is also the first record in latitudes south of municipality of Pelotas, Rio Grande do Sul state, Brazil, and also the first time the species is recorded in a Forest remnant of a temperate grassland biome.

Key words: Lepidoptera, Lycaenidae, Uruguay, first record

Arcas Swainson, 1832 (Lycaenidae: Theclinae) comprises nine green and blue metallic butterfly species. Swainson (1832) described *Arcas* as a subgenus of Theclinae and designated *Papilio imperialis* Cramer, 1775 as type species. Nicolay (1971) reviewed *Arcas*, and established it as a valid genus of Lycaenidae, separating those species that belong to *Arcas* from the all-inclusive genus *Thecla* Fabricius. Nicolay's classification remained stable for more than three decades, including the concept that the two genera most closely related to *Arcas* are *Atlides* Hübner, 1819 and *Pseudolycaena* Wallengren, 1858. Subsequently, further taxa were added, two described by Austin and Johnson (1995) and two by Salazar and Constantino (1995a, 1995b). Bálint (2002, 2006) worked on Neotropical lycaenid types at The Natural History Museum (London), resulting in new synonyms.

Unique identifying traits for *Arcas* include a hindwing anal lobe cleft approximately 4 mm long and trail up to 15 mm in length coupled with rows of emerald colored scales on the ventral wing surfaces. *Arcas ducalis* can be distinguished by the well-defined carmine disc and metallic yellow margin on the ventral hindwing (Bálint 2002, 2006).

Considered rare or vulnerable (Casagrande and Mielke 1993; Brown and Freitas 2000; Otero et al. 2000; Morais 2012;), these species are the most exquisite of all

Neotropical Theclinae, typical of large areas of natural wet forest and usually disappearing in disturbed areas. They are easy to find where present and are thus good indicators of undisturbed forest systems (Nicolay 1971; Brown et al. 1998; Brown and Freitas 1999; Robbins et al. 2012). Brown (1982) and D'Abrera (1995) pointed out that *A. ducalis* is endemic to the Atlantic Forest and until now it has been recorded in the Brazilian states of Espírito Santo (Brown and Freitas 2000), Rio de Janeiro, Paraná (Nicolay 1971; Dolibaina et al. 2010, 2011), Santa Catarina (Nicolay 1971) and Rio Grande do Sul (Iserhard and Romanowski 2004; Iserhard 2009; Morais et al. 2007, 2012; Giovenardi et al. 2013).

The first record of *A. ducalis* in Uruguay is an individual observed in June 2013 at Quebrada de los Cuervos (exact location: 32.907250° S, 054.447885° W) (Figure 1). It was identified as *Arcas ducalis* (Westwood, 1852) with the keys of Nicolay (1971) and Bálint (2006). A copy of the digital image is deposited in the database of the Entomology Collection the Faculty of Sciences of the National University of Uruguay. The distribution map of the species was developed with data obtained from



Figure 1. Imago of *Arcas ducalis* found in Quebrada de los Cuervos (ventral view).



Figures 2–3. Riparian forest of Quebrada de los Cuervos (Uruguay).

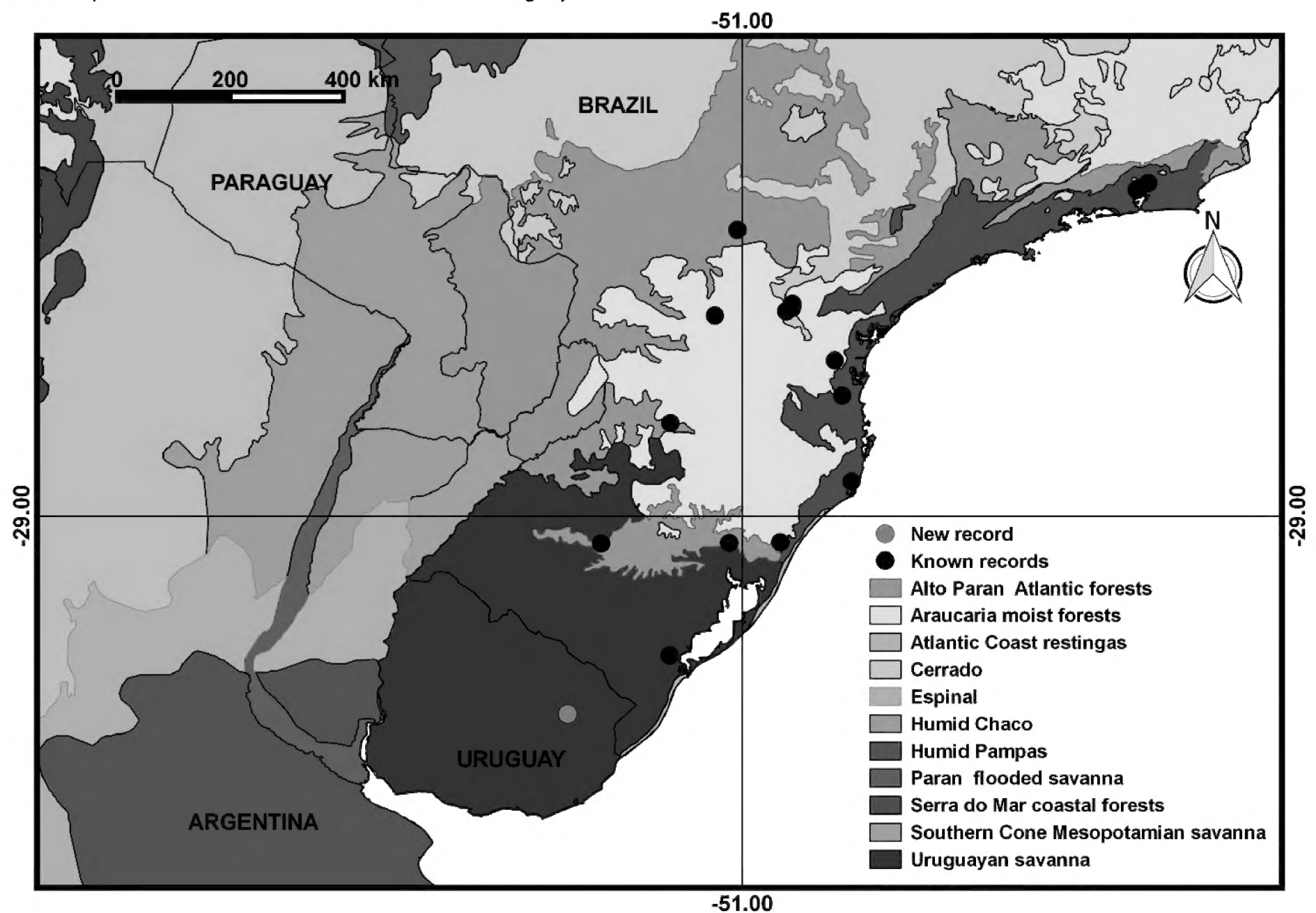


Figure 4. Distribution map of *Arcas ducalis* on terrestrial ecoregions according to Olson et al. (2001).

bibliography review and entomological collection: Faculty of Agriculture, Science Faculty (UdeLAR Montevideo, Uruguay), collections of Institute and Foundation Miguel Lillo (Tucumán, Argentina).

Quebrada de los Cuervos was the first (29 September of 2008) area to enter the National System of Protected Areas (SNAP available at <http://www.snap.gub.uy>), under the category of protected landscape (Figures 2 and 3). It is part of a mountainous system, which has an important role as a natural corridor between the different mountain environments in the south and subtropical forests of Rio Grande do Sul, Brazil, integrating a group of Uruguayan ravines of the Northeast, which is shown

to be a relict of subtropical forest, and connecting different environments consisting on a mosaic of grasslands, forests and shrubs.

This record of *A. ducalis* in Uruguay is important because it is the first record of the species outside the subtropical and temperate forest (Olson 2001), extending its known range over 200 km (Figure 4). This is also the first record in a Forest remnant of a temperate grassland biome and the first record in latitudes south of municipality of Pelotas, Rio Grande do Sul state (Brazil) (Kruger and Silva 2003; Giovenardi et al. 2013). The riparian reminiscent forest at “Quebrada de los Cuervos” looks sufficient for being a possible locality of *Arcas ducalis*.

ACKNOWLEDGEMENTS

We would like to thank Adrián Stagi for providing the digital images; Alfred Moser for confirming the identification of the species; André Victor Lucci Freitas (UNICAMP) for bibliography provided; Carolina Berta for permission to access the IFML entomological collection; Antonio R. Muñoz for the critical reading and useful comments on the manuscript, and the anonymous reviewers made usefulness suggestions to enhance the manuscript. M. G. Bentancur received doctoral fellowship of Agencia Nacional de Investigación e Innovación.

LITERATURE CITED

- Austin, G.T. and K. Johnson. 1995. Theclinae of Rondonia, Brazil: *Arcas*, with description of three new species (Lepidoptera: Lycaenidae). *Tropical Lepidoptera* 6(1): 31–39.
- Bálint, Z.S. 2002. Miscellaneous notes on *Arcas* Swainson, 1832 (Lepidoptera: Lycaenidae, Eumaeini). *Annales Historico-Naturales Musei Nationalis Hungarici* 94: 141–161. http://publication.nhmus.hu/pdf/annHNHM/Annals_HNHM_2002_Vol_94_141.pdf
- Bálint, Z.S. 2006. *Arcas* Swainson, 1832 is revisited: review of some species-group names, identification of the sister group and a key for species (Lepidoptera, Lycaenidae: Eumaeini). *Annales Historico-Naturales Musei Nationalis Hungarici* 98: 147–158. http://publication.nhmus.hu/pdf/annHNHM/Annals_HNHM_2006_Vol_98_147.pdf
- Brown, K.S. Jr. 1993. Selected Neotropical species; pp. 146–149, in: T.R. New (ed.). *Conservation biology of Lycaenidae (butterflies)*. Occasional Paper of the IUCN Species Survival Commission No. 8. Gland: International Union for Conservation of Nature and Natural Resources. 173 pp.
- Brown, K.S. Jr. and A.V.L. Freitas. 1999. Lepidoptera; pp. 227–243, in: C.R.F. Brandão and E.M. Canello, (eds.). *Biodiversidade do Estado de São Paulo, Brasil. Invertebrados terrestres*. São Paulo: FAPESP.
- Brown, K.S. Jr. and A.V.L. Freitas. 2000. Diversidade de Lepidoptera em Santa Teresa, Espírito Santo. *Boletim do Museu de Biologia Mello Leitão (N.S.)* 11–12: 71–116.
- Brown, K.S. Jr., O.H.H. Mielke and M. Casagrande. 1998. Especies de Lepidoptera ameaçadas do Estado de Minas Gerais; pp. 412–415, 512–559, in: A.B. Machado, G.A.B. Fonseca, R.B. Machado, L.M.S. Aguiar and L.V. Lins (eds.). *Livro vermelho das especies ameaçadas de extinção do fauna de Minas Gerais*. Belo Horizonte, MG, Brasil: Fundação Biodiversitas.
- Casagrande, M.M. and O.H.H. Mielke. 1993. Borboletas (Lepidoptera) ameaçadas de extinção no Paraná. *Revista Brasileira de Zoologia* 9(1–2): 75–92. doi: 10.1590/S0101-81751992000100010
- D'Abrera, B. 1995. *Butterflies of the Neotropical Region*. Part VII. Lycaenidae. London: Hill House, Victoria, Black Rock. i–xi + 1098–1270.
- Dolibaina, D.R., O.H.H. Mielke and M.M. Casagrande. 2011. Borboletas (Papilionoidea e Hesperioidea) de Guarapuava e arredores, Paraná, Brasil: um inventário com base em 63 anos de registros. *Biota Neotropica* 11(1): 343–354. doi: 10.1590/S1676-06032011000100031
- Dolibaina, D.R., E. Carneiro, F.M. Dias, O.H.H. Mielke and M.M. Casagrande. 2010. Registros inéditos de borboletas (Papilionoidea e Hesperioidea) ameaçadas de extinção para o Estado do Paraná, Brasil: novos subsídios para reavaliação dos critérios de ameaça. *Biota Neotropica* 10(3): 75–81. <http://www.biotaneotropica.org.br/v10n3/pt/fullpaper?bno1210032010+pt>
- Giovenardi, R., R. A. Di Mare, O.H.H. Mielke, M.M. Casagrande, E. Carneiro. 2013. Mariposas de Rio Grande do Sul, Brasil (Lepidoptera: Papilionoidea, Hesperioidea). *Revista Colombiana de Entomología* 39(2): 267–275. <http://www.scielo.org.co/pdf/rcen/v39n2/v39n2a16.pdf>
- Iserhard, C.A. and H.P. Romanowski. 2004. Lista de espécies de borboletas (Lepidoptera, Papilionoidea e Hesperioidea) da região do vale do rio Maquiné, Rio Grande do Sul, Brasil. *Revista Brasileira de Zoologia* 21(3): 649–662. doi: 10.1590/S0101-81752004000300027
- Iserhard, C.A. 2009. Estrutura e composição da assembléia de borboletas (Lepidoptera: Papilionoidea e Hesperioidea) em diferentes formações da floresta Atântica do Rio Grande do Sul, Brasil [Ph.D. Thesis]. Porto Alegre: Universidade Federal do Rio Grande do Sul. 168 pp. Accessed at <http://www.lume.ufrgs.br/bitstream/handle/10183/21416/000735153.pdf?...1,5 July 2015>.
- Krüger, C.P. and E.J.E. Silva. 2003. Papilionoidea (Lepidoptera) de Pelotas e seus arredores, Rio Grande do Sul, Brasil. *Entomologia y Vectores* 10(1): 31–45.
- Morais, A.B.B., H.P. Romanowski, C.A. Iserhard, M.O.O. Marchiori and R. Segui. 2007. Mariposas del sur de Sudamérica (Lepidoptera: Hesperioidea y Papilionoidea). *Ciencia & Ambiente* 35(2): 29–46. http://www.ufrgs.br/zooborboletas/images/publicacoes/Morais_et_al_2007.pdf
- Morais, A.B.B., R. Lemes and C.D. Ritter. 2012. Borboletas (Lepidoptera: Hesperioidea e Papilionoidea) de Val de Serra, região central do Rio Grande do Sul, Brasil. *Biota Neotropica* 12(2): 175–183. <http://www.biotaneotropica.org.br/v12n2/en/abstract?inventory+bno1412022012>
- Nicolay, S.S. 1971. A review of the genus *Arcas* with descriptions of new species (Lycaenidae, Strymonini). *Journal of the Lepidopterists' Society* 25: 87–108.
- Olson, D.M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V.N. Powell, E.C. Underwood, J.A. D'Amico, I. Itoua, H.E. Strand, J.C. Morrison, C.J. Loucks, T.F. Allinutt, T.H. Ricketts, Y. Kura, J.F. Lamoreux, W.W. Wettengel, P. Hedao and K. Kassem. 2001. Terrestrial ecoregions of the worlds: a new map of life on Earth. *BioScience* 51(11): 933–938. doi: 10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2
- Otero, L.S., K.S. Brown, O.H.H. Mielke, R.F. Monteiro, J. Costa, M.V. Macêdo, N.C. Maciel, J. Becker, N.C. Salgado, S.B. Santos, G.E. Moya, J.M. Almeida and M.D. Silva. 2000. Invertebrados terrestres; pp. 53–62, in: H.G. Bergallo, C. F. D. Rocha, M.A.S. Alves and M. Van Sluys (eds.). *A fauna ameaçada de extinção do estado do Rio de Janeiro*. Rio de Janeiro: Editora UERJ.
- Robbins, R.K., A.R.P., Martins, R.C. Busby and M. Duarte. 2012. Loss of male secondary sexual structures in allopatry in the Neotropical butterfly genus *Arcas* (Lycaenidae: Theclinae: Eumaeini). *Insect Systematics & Evolution* 43(1): 35–65. doi: 10.1163/187631212X626195
- Salazar, J.A. and L.M. Constantino. 1995a. Sobre algunas especies colombianas del género *Arcas* Swainson, 1832 y descripción de una nueva (Lepidoptera: Lycaenidae). *Shilap Revista de Lepidopterología* 23(90): 123–128.
- Salazar, J.A. and L.M. Constantino. 1995b. Descripción de un nuevo género y dos especies nuevas de lepidópteros de la Cordillera Central de Colombia (Lepidoptera: Lycaenidae). *Shilap Revista de Lepidopterología* 23(92): 457–464.

Authors' contribution statement: MGBV performed the data collection, identified material, prepared the map, and drafted the manuscript. ERMM and JCG provide data from the Science Faculty collection and revised the text.

Received: 19 May 2015

Accepted: 5 August 2015

Academic editor: Reza Zahiri